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ABSTRACT

The curriculum guide outlines a course designed to provide instruction in planning, laying out, and building various types of roofs. The course is 135 hours in length and contains seven blocks of instruction (introduction to roofs, commercial buildings, residential buildings, hip roofs, intersecting roofs, applied mathematics, and a quinmester post-test) which are subdivided into several units each. Students in this course will acquire the knowledge, understanding and skills to participate in roof construction. Instruction is accomplished by means of lectures and demonstrations. Emphasis is placed on manipulative processes. Also included are the course goals, specific block objectives, and a course outline. Appended are a bibliography and a quinmester sample post-test. (Author/BP)

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AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

Course Outline

CARPENTRY - 9163
(Roof Types and Mathematics)

Department 48 - Quin 901893

CE003 336

DADE COUNTY PUBLIC SCHOOLS
DIVISION OF INSTRUCTION • 1974

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D A D E C O U N T Y P U B L I C S C H O O L S

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M I A M I, F L O R I D A 33132

Course Outline

CARPENTRY - 9163
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county office of

VOCATIONAL AND ADULT EDUCATION

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Dr. E. L. Whigham, Superintendent of Schools
Dade County Public Schools
Miami, Florida 33132

October 9, 1974

Published by the School Board of Dade County

COURSE DESCRIPTION

9163	48	901893	Roof Types and Mathematics
State Category Number	County Dept. Number	County Course Number	Course Title

Overview: A study of geometric roof designs, the adaptability and construction of each.

Objectives: Students will cut lumber and construct a corner section of a hip roof.

Content: A study of gable, shed, hip, gamble and mansard roofs and the construction of them.

Selection Considerations: Students in this course will be expected to have the skills and knowledge of building construction plans, concrete forms, structural foundations and wall construction, in addition to a basic knowledge of mathematics.

PREFACE

This fifth quinmester course outline is designed to provide instruction in planning, laying out and building various type roofs.

This outline is 135 hours in length and contains seven blocks of study which are subdivided into several units each.

Students in this course will be expected to have the skills and knowledge of building construction plans, concrete forms, structural foundations and walls, in addition to a basic knowledge of mathematics.

Upon completing this intermediate course, students will have the knowledge, understanding and the skills to participate in meaningful roof construction.

Instruction is accomplished by means of lectures and demonstrations. Emphasis is placed on manipulative processes.

The bibliography lists materials offering additional information in this field.

This outline was developed through the cooperative efforts of the instructional and supervisory personnel and the Vocational Curriculum Materials Service, and has been approved by the Dade County Vocational Curriculum Committee.

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with Suggested Hourly Breakdown

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GOALS

The student must be able to:

1. Demonstrate the ability to develop attitudes, skills, knowledge and values required for entering the carpentry trade.

2. Develop exploratory craftsmanship ability and knowledge in specific areas within this roof construction course in order to advance in the carpentry trade.

3. Become acquainted with the various career opportunities in this broad occupational field.

4. Develop good safety habits and discipline as they apply to the daily trade obligations.

5. Increase the manipulative skills and knowledge as they apply to roof construction.

SPECIFIC BLOCK OBJECTIVES

BLOCK I - INTRODUCTION TO ROOFS

The student must be able to:

1. Explain the difference between a poured concrete beam and a prestressed concrete beam.
2. Define and point out the differences between a hip and a gable roof.
3. Sketch the end view of a gable roof and explain a unit span, a unit run and a unit rise.

BLOCK II - COMMERCIAL BUILDINGS

The student must be able to:

1. Sketch and explain the use of a metal beam.
2. Explain the need for double tee beams.

BLOCK III - RESIDENTIAL BUILDINGS

The student must be able to:

1. Describe the difference between a common and a jack rafter.
2. List three of the four roof framing units.
3. Lay out a roof ridge board for receiving rafters 16" O.C.

BLOCK IV - HIP ROOFS

The student must be able to:

1. Explain the necessity for the "rafter table" on the framing square.
2. Construct a portion of a gable roof.
3. Lay out valley jack rafters and nail to a valley rafter.

BLOCK V - INTERSECTING ROOFS

The student must be able to:

1. Explain all of the "tables" on the framing square.
2. Sketch and explain the reason for "framing point."
3. Demonstrate "shortening" using two pieces of wood.

BLOCK VI - APPLIED MATHEMATICS

The student must be able to:

1. Total the lengths of all rafters shown on a house roof plan.
2. Domonstrate the ability to read and use the framing square.
3. Solve three predetermined problems using the framing square.
4. Calculate and total the square footage of three different type roofs.

BLOCK VII - QUINMESTER POST-TEST

Course Outline

CARPENTRY - 9163
(Roof Types and Mathematics)

Department 48 - Quin 901893

I. INTRODUCTION TO ROOFS

A. Commercial Flat
1. Poured concrete
2. Wood frame
   a. Beams and rafters
   b. Plywood, shiplap or tongue and groove
   c. Construction felt and asphalt
3. Prestressed concrete
   a. Single
   b. Double
4. Steel bar joists

B. Residential
1. Design
   a. Gable
   b. Hip
   c. Shed
   d. Various others
2. Purpose and expense
   a. Pitch
   b. Span
   c. Quality
3. Construction
   a. Prefabricated trusses
   b. Custom framing
      (1) Concrete tie beam support
      (2) Double wood plate support
4. Sheathing
   a. Plywood mainly
   b. Tongue and groove or shiplap
5. Weatherproofing
   a. Slated asphalt roll
   b. Asphalt and/or aggregate
   c. Tiles or shingles

II. COMMERCIAL BUILDINGS

A. Metal Bridging
1. Diagonal
2. Horizontal
   a. Underslung
   b. Square ends
   c. One way pitch
   d. Two way pitch
      (1) Corrugated metal sheathing
      (2) Wood sheathing

B. Concrete Bridging
   1. Slab cast in place
      a. Reinforcing bars
      b. Reinforcing wire mesh
   2. Precast concrete
      a. Single tee
      b. Double tee
      c. Monowing
      d. Channel slab
      e. Hollow core slab

C. Beams
   1. Steel reinforced concrete
      a. Wall tie beam
      b. Parallel beam
      c. Prestressed I girder
      d. Prestressed tee beam
   2. Steel
      a. I-beam
      b. Channel

D. Weatherproofing
   1. Sheet insulation
   2. Construction felt
   3. Mopped asphalt
   4. Asphalt and aggregate

III. RESIDENTIAL BUILDINGS

A. Gable Rafter Framing
   1. Span
   2. Run
   3. Rise
   4. Line length
   5. Tail length

B. Roof Framing Units
   1. Unit span
   2. Unit rise
   3. Unit length
   4. Carpenter framing square

C. Common Rafter Layout
   1. Line length
      a. Cutting to ridge board
      b. Cutting seat and tail
   2. Cornice length (overhang)
      a. Tail line length
      b. Facia cut line

IV. HIP ROOFS

A. Main Roof Plan
   1. Ridge board layout
      a. True length measuring
      b. Squaring and cutting
      c. Nailing
   2. Hip rafter layout
      a. Framing square "rafter table"
      b. Measuring and squaring rafter edge
      c. Rafter ridge "framing point"
      d. Rafter "shortening"
      e. Rafter double bevel cutting lines
      f. Plate seat cutting lines
   3. Hip rafter - ridge installation
      a. Rafter center line
      b. "Framing point" aligning
      c. Plate seat
      d. O.C. nailing

B. Hip Jack and Common Rafter
   1. Hip jack layout
      a. Jack to hip rafter O.C. intersect
      b. Double bevel cutting lines
   2. Hip jack-hip rafter installation
      a. Jack center line
      b. "Framing point" aligning
      c. Plate seat
      d. O.C. nailing
   3. Common rafter layout
      a. Rafter to ridge single bevel cutting line
      b. Plate seat bevel cutting lines
   4. Common rafter installation
      a. Rafter-ridge O.C. nailing
      b. Rafter-plate O.C. nailing

V. INTERSECTING ROOFS

A. Gable Roof Plan
   1. Ridge board layout
      a. Ridge to ridge intersect
      b. Ridge board "shortening"
      c. Nailing
   2. Valley rafter layout
      a. Framing square "rafter table"
      b. Measuring and squaring rafter edge
      c. Rafter to ridge "framing point"
      d. Rafter "shortening"
      e. Rafter to ridge double bevel cutting lines
      f. Rafter to plate double cutting lines
   3. Valley rafter-ridge board installation
      a. Valley center line
      b. "Framing point" alignment
      c. O.C. nailing

B. Valley Jack Rafters
   1. Valley jack layout
      a. Jack to ridge intersect
         (1) Jack edge cutting line
         (2) Plumb cutting line
      b. Jack to valley rafter intersect
         (1) Jack edge cutting line
         (2) Plumb cutting line
   2. Valley jack installation
      a. Jack to ridge O.C. nailing
      b. Jack to valley rafter O.C. nailing
   3. Weatherproofing

VI. APPLIED MATHEMATICS

A. Linear
   1. Using framing square
      a. Rise and run
      b. Pitch
      c. Roof layout
   2. Tables of the square
      a. Rafter table
      b. Essex table
      c. Octagon table
      d. Brace table

B. Calculating in English and Metric Systems
   1. Totaling lengths of materials
      a. Ridge board
      b. Hip and valley rafters
      c. Jack rafters
      d. Common rafters
      e. Rafter bracing
   2. Dimensions
      a. Span and projection
      b. Unit span
      c. Run
      d. Unit run
      e. Rise
      f. Unit rise
      g. Line length and overhang (rafter)
      h. Body and tail (rafter)
   3. Cost per foot and decimeter
      a. Linear or running measure
      b. Square measure
         (1) Plywood
         (2) Asphalt roofing felt
         (3) Slated roofing felt
         (4) Tiles and shingles

VII. QUINMESTER POST-TEST

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A P P E N D I X

Quinmester Post-Test Sample

QUINMESTER POST-TEST

Name_____ Score_____ Date_____

Multiple Choice

1. The hip roof is primarily used on
   a. garages.
   b. factories.
   c. homes.
   d. barns.

2. The gable roof is primarily used on
   a. houses.
   b. offices.
   c. schools.
   d. stores.

3. The flat roof is primarily used on
   a. churches.
   b. barns.
   c. warehouses.
   d. homes.

4. Roof framework consists mostly of
   a. rafters.
   b. braces.
   c. ridges.
   d. plates.

5. The highest board on a gable roof is the
   a. brace.
   b. rafter.
   c. ridge.
   d. crown.

6. The letters O.C. mean
   a. on cost.
   b. overhang cover.
   c. overcut.
   d. on center.

7. Roof layout means mainly to lay out
   a. hips.
   b. rafters.
   c. cripples.
   d. jacks.

8. The most practical rafter layout measuring tool is the
   a. yardstick.
   b. folding rule.
   c. framing square.
   d. steel tape.

9. The gable roof never requires a
   a. ridge.
   b. valley rafter.
   c. common rafter.
   d. hip jack.

10. The plumb cut line runs
   a. horizontally.
   b. vertically.
   c. diagonally.
   d. consistently.

11. In relation to rafters, sheathing is installed
   a. on end.
   b. between.
   c. under.
   d. upon.

12. An ornamental gable is one which is
   a. small.
   b. fancy.
   c. false.
   d. true.

13. The width of a house is called the
   a. span.
   b. run.
   c. rise.
   d. body.

14. Half the width of a house is called the
   a. span.
   b. run.
   c. rise.
   d. body.

15. The distance from the plate to the roof top is called
   a. projection.
   b. run.
   c. rise.
   d. unit length.

16. The distance from the roof peak to outside edge of house is called
   a. unit length.
   b. projection.
   c. rise.
   d. span.

17. Rafters are usually cut from lumber measuring
   a. 2" x 6".
   b. 4" x 6".
   c. 3" x 8".
   d. 4" x 8".

18. To lay out only a few rafters we would use a
    a. meterstick.
    b. millimeter.
    c. yardstick.
    d. framing square.

19. "Bevel" cutting means the same as
    a. vertical.
    b. angle.
    c. plumb.
    d. bevel board.

20. A gable roof plan shows ridge board and
    a. hip rafters.
    b. valley rafters.
    c. common rafters.
    d. jack rafters.

ANSWER KEY TO QUINMESTER POST-TEST

1. c
2. a
3. c
4. a
5. c
6. d
7. b
8. d
9. b
10. b
11. d
12. c
13. a
14. b
15. c
16. a
17. a
18. d
19. b
20. c